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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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SCOTT W HEWETT
400 WEST THIRD STREET
#223
SANTA ROSA, CA 95401

EXAMINER	
O NEILL, GARY W	

ART UNIT	PAPER NUMBER
2873	

DATE MAILED: 05/23/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/765,522	Applicant(s) HICHWA ET AL.	
	Examiner Gary O'Neill	Art Unit 2873	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-37* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *16 and 17* is/are allowed.

6)☒ Claim(s) *1,3-8,12,13,18,20-22 and 25-37* is/are rejected.

7)☒ Claim(s) *2,9-11,14,15,19,23 and 24* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *29 May 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received

2.☐ Certified copies of the priority documents have been received in Application No. _____

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *4,5*.
4) ☒ Interview Summary (PTO-413) Paper No(s). *6*.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☒ Other: *Detailed Action*.

Interview Summary	Application No. 09/765,522	Applicant(s) HICHWA ET AL.	
	Examiner Gary O'Neill	Art Unit 2873	

All participants (applicant, applicant's representative, PTO personnel):

(1) *Gary O'Neill*.

(2) *Scott Hewett*.

(3)_____.

(4)_____.

Date of Interview: *14 May 2002* .

Type: a)☒ Telephonic b)☐ Video Conference
c)☐ Personal [copy given to: 1)☐ applicant 2)☐ applicant's representative]

Exhibit shown or demonstration conducted: d)☐ Yes e)☒ No.
If Yes, brief description: _____ .

Claim(s) discussed: *None* .

Identification of prior art discussed: *Related applications cited on page one of specification* .

Agreement with respect to the claims f)☐ was reached. g)☐ was not reached. h)☒ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: *Examiner had requested the serial numbers for concurrently filed applications cited on page one of specification. Attorney responded that serial no. 09765520 corresponds to Docket No. OC0100US; and serial number 09764919 corresponds to Docket No.111500-IMT* .

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

i)☒ It is not necessary for applicant to provide a separate record of the substance of the interview(if box is checked).

Unless the paragraph above has been checked, THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN ONE MONTH FROM THIS INTERVIEW DATE TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.

Examiner Note: You must sign this form unless it is an Attachment to a signed Office action.

Examiner's signature, if required

Summary of Record of Interview Requirements

Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record
A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews
Paragraph (b)
In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

37 CFR §1.2 Business to be transacted in writing
All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:
- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case unless both applicant and examiner agree that the examiner will record same. Where the examiner agrees to record the substance of the interview, or when it is adequately recorded on the Form or in an attachment to the Form, the examiner should check the appropriate box at the bottom of the Form which informs the applicant that the submission of a separate record of the substance of the interview as a supplement to the Form is not required.

It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:
1) A brief description of the nature of any exhibit shown or any demonstration conducted,
2) an identification of the claims discussed,
3) an identification of the specific prior art discussed,
4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
5) a brief identification of the general thrust of the principal arguments presented to the examiner,
   (The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
6) a general indication of any other pertinent matters discussed, and
7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.

DETAILED ACTION

Information Disclosure Statements

1. Receipt is acknowledged of Information Disclosure Statements submitted 6/7/01 and 8/6/01, which have been considered by the examiner.

Drawings

2. The corrected or substitute drawings were received on 5/29/01. These drawings are acceptable.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in-
> (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or
> (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

4. Claims 1, 3-8, 13, 18, 20-22, and 25-28 are rejected under 35 U.S.C. 102(e) as being anticipated by Edwards et al (6389189).

Edwards et al discloses, as in claim 1, an optical switch (1) comprising: a mounting substrate (10); a micro-electro-mechanical system die (20) mounted on an edge to the mounting substrate, the MEMs die including a mirror (22) movably attached to a base portion of the MEMs die with a flexure hinge (28), the mirror moving from a

first position to a second position in a plane essentially normal to a major surface of the mounting substrate (figs. 7 & 8); an input port (18) disposed to couple an optical signal to a first output port (12) when the mirror is in the first position and to couple the optical signal to a second output port (19') when the mirror is in the second position.

Edwards et al discloses, as in claim 3, the optical switch wherein the input port provides the optical signal to the mirror in the second position at an angle of between about 15-45 degrees from a normal of the mirror (fig.1).

Edwards et al discloses, as in claim 4, the optical switch wherein the input port provides the optical signal to the mirror in the second position at an angle of less than about 22.5 degrees from a normal of the mirror (fig.1).

Edwards et al discloses, as in claim 5, the optical switch wherein the mirror has a first mirrored surface and a second mirrored surface, the second mirrored surface being opposite the first mirrored surface, and further comprising a second input port disposed to optically couple a second optical signal to the first output port when the mirror is in the second position (fig.1 & col.4, lines 43-52).

Edwards et al discloses, as in claim 6, a micro-electro-mechanical system ("MEMs") optical cross connect (fig.1) comprising: a mounting substrate (10) having a mounting surface; first MEMs optical switch cell (20) affixed to the mounting surface on an edge of the first MEMs optical switch cell and aligned to direct a first optical beam (Ls) propagating along a beam path from a first optical input (18) to a first optical output (12) when a first optical switching element of the first MEMs optical switch cell is in the beam path; and a second MEMs optical switch cell (20') affixed to the mounting surface

and aligned to direct the first optical beam from the first optical input to a second optical output (19') when a second optical switching element (22') of the second MEMs optical switch cell is in the beam path and the first optical switching element is rotated in a plane essentially normal to the mounting surface out of the beam path (col.6, lines 14-21 & col.7, lines 20-30).

Edwards et al discloses, as in claim 7, the MEMs optical cross connect wherein the first optical switching element (20) comprises a reflector (22).

Edwards et al discloses, as in claim 8, the MEMs optical cross connect wherein the first optical switching element comprises a metallic mirror (22).

Edwards et al discloses, as in claim 13, the MEMs optical cross connect (fig.1) wherein the first optical switching element is a two-sided mirror having a first mirrored side and a second mirrored side, the first optical beam reflecting off the first mirrored side of the two-sided mirror when the two-sided mirror is in the beam path and further comprising a second optical input disposed to provide a second optical beam to the second mirrored side of the two-sided mirror when the two-sided mirror is in the beam path, the second optical beam being reflected off the second mirrored side to a third optical output wherein the first optical beam optically couples to the third optical output when the first optical element and the second optical element are both switched out of the beam path (fig.1 & col.4, lines 43-52).

Edwards et al discloses, as in claim 18, a micro-electro-mechanical system ("MEMs") optical cross connect comprising: a mounting substrate (10) having a mounting surface; a first latching MEMs optical switch cell (20) affixed to the mounting

surface and aligned to direct a first optical beam (Ls) from a first optical input (18) to a first optical output (12) when a first mirror (22) of the first MEMs optical switch cell is latched (25) in an extended position (col.5, lines 55-60); and a second MEMs optical switch cell (20') affixed to the mounting surface and aligned to direct the first optical beam from the first optical input to a second optical output (19') when a second mirror (22') of the second MEMs optical switch cell is latched (25) in a second extended position and the first mirror is rotated in a plane essentially normal to the mounting surface out of the beam path to latch in a retracted position (col.6, lines 14-21 & col. 7, lines 20-30).

Edwards et al discloses, as in claim 20, an optical cross connect comprising: N optical input ports where N is a first integer (fig.1); M optical output ports where M is a second integer (fig.1); and N times M micro-electro-mechanical system optical switch dice (col.4, lines 43-52), each of the micro-electro-mechanical system optical switch dice having a drive (25) capable of switching a mirror (22) from a first position to a second position (col.5, lines 48-65) in response to a switching signal (col.18, lines 24-37) provided to the micro-electro-mechanical switch die.

Edwards et al discloses, as in claim 21, the optical cross connect wherein N=M (col.8, lines 50-52).

Edwards et al discloses, as in claim 22, the optical cross connect wherein the drive is a magnetic drive (col.8, lines 65-67).

Edwards et al discloses, as in claim 25, a method for assembling an optical cross connect, the method comprising: providing a mounting substrate (10) with a first optical

input (18), a second optical input (fig.1), a first optical output (12), and a second optical output (19'); optically aligning a first micro-electro-mechanical system die with a first optical switching element to direct a first optical beam from the first optical input to the first optical output (col.6, lines 14-21 & col.7, lines 20-30); affixing the first micro-electro-mechanical system die to the mounting substrate; optically aligning a second micro-electro-mechanical system die with a second optical switching element to direct a second optical beam from the second optical input to the second optical output (col.6, lines 14-21 & col.7, lines 20-30); and affixing the second micro-electro-mechanical system die to the mounting substrate (fig.5A-5H).

Edwards et al discloses, as in claim 26, the method further comprising a step, after the affixing the first micro-electro-mechanical system die step, of latching the first optical switching element in a retracted position (col.7, lines 1-57).

Edwards et al discloses, as in claim 27, the method wherein the latching step comprises applying a mechanical force (col.7, lines 1-57; rotate).

Edwards et al discloses, as in claim 28, the method wherein the first optical switching element is a mirror (22) and the second optical switching element is a mirror (22) and further comprising steps of selecting the first micro-electro-mechanical system die according to a first mirror criterium; and selecting the second micro-electro-mechanical system die according to a second mirror criterium (col.7, lines 1-57).

5. Claims 29-37 are rejected under 35 U.S.C. 102(e) as being anticipated by Jin et al. (6256430).

Jin et al. discloses, as in claim 29, a method for operating an optical cross connect, the method comprising: measuring an impedance of a first circuit of a first optical switch in the optical cross connect; comparing the impedance to a reference value to determine a switch state of the first optical switch; providing a switch state output; and comparing the switch state output to an expected switch state (col.4, lines 24-50, position sensing feedback system & fig.4A,4B).

Jin et al. discloses, as in claim 30, the method further comprising a step, after the comparing the switch state output, if the switch state output is not the expected switch state, of providing a switching signal to the first optical switch (col.4, lines 24-50, position sensing feedback system & fig.4A,4B).

Jin et al. discloses, as in claim 31, the method further comprising a step, after the comparing the switch state output, if the switch state output is not the expected switch state, of generating an error signal identifying the first optical switch in the optical cross connect (col.4, lines 24-50, position sensing feedback system & fig.4A,4B).

Jin et al. discloses, as in claim 32, the method further comprising a step of, after the comparing the switch state output, if the switch state output is the expected switch state, measuring a second impedance of a second circuit of a second optical switch in the optical cross connect (col.4, lines 24-50, position sensing feedback system & fig.6A,6B).

Jin et al. discloses, as in claim 33, a method for operating an optical cross connect having a plurality of optical switches, each of the optical switches having a magnetic drive, the method comprising: measuring an impedance of a first circuit of a

first optical switch in the optical cross connect; comparing the impedance to a reference value to determine a state of the first optical switch; providing a switch state output; and comparing the switch state output to an expected switch state; and, if the switch state output is not the expected switch state, providing a switching signal to the first optical switch (col.4, lines 24-50, position sensing feedback system & fig.4A,4B).

Jin et al. discloses, as in claim 34, a method for operating an optical cross connect having a plurality of optical switches, each of the optical switches having a magnetic drive, the method comprising: measuring an impedance of a first circuit of a first optical switch in the optical cross connect; comparing the impedance to a reference value to determine a state of the first optical switch; providing a switch state output; and comparing the switch state output to an expected switch state; and, if the switch state output is not the expected switch state, providing a switching signal to the first optical switch; and generating an error signal identifying the first optical switch in the optical cross connect (col.4, lines 24-50, position sensing feedback system & fig.4A,4B).

Jin et al. discloses, as in claim 35, a method of determining a configuration of an optical cross connect having N optical inputs, M optical outputs, and NxM optical switching cells where N and M are integers, the method comprising: measuring an impedance for each of the NxM optical switching cells; comparing the measured impedance of each of the NxM optical switching cells against a reference value; and generating a switch state signal for each of the NxM optical switching cells (col.4, lines 24-50, position sensing feedback system & fig.4A,4B).

Jin et al. discloses, as in claim 36, the method further comprising steps of comparing each of the switch state signals against a corresponding expected switch state; and, if an optical switching cell is not in an expected state, generating an error signal identifying the optical switching cell that is not in the expected state (col.4, lines 24-50, position sensing feedback system & fig.4A,4B).

Jin et al. discloses, as in claim 37, a method of operating an optical cross connect, the method comprising: providing a plurality of electronic control signals to a plurality of micro electro-mechanical system optical switch dice in the optical cross connect to configure the optical cross connect to a selected configuration; removing electrical input to the optical cross connect; and maintaining the selected configuration (col. 3, lines 35-57 & col.4, lines 24-50, latchable magnets & fig.2A-2C).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Edwards et al. (6389189) as applied to claim 6 above, and further in view of Jin et al. (6256430).

Edwards et al. discloses the claimed invention as cited above except for a latching MEMs optical switch cell which maintains switch states without applied electrical power, as cited in claim 12. Within the same field of endeavor (optical

switching), Jin et al. provides disclosure of a MEMs optical cross connect wherein the first MEMs optical switch cell is a latching optical switch cell (10) configured to maintain the first optical switching element in a first position (delta1) in a first switch state and in a second position (delta2) in a second switch state without applied electrical power (col.1, lines 44-52 & col.3, lines 35-56).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to provide the latching optical switch cell of Jin et al. with the MEMs optical cross connect of Edwards et al. for the purpose of maintaining mirror position without continuous power (Jin et al. col.1, lines 44-52).

Allowable Subject Matter

8. Claims 16 and 17 are allowed.

9. Claims 2, 9-11, 14, 15, 19, 23, and 24 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

10. The following is a statement of reasons for the indication of allowable subject matter: The prior art taken either singularly or in combination fails to anticipate or fairly suggest the limitations of the claims, in such a manner that a rejection under 35 U.S.C. 102 or 103 would be proper. The prior art fails to teach a combination of all the claimed features as presented in claims 2, 9-11, 14, 15, 19, 23, and 24, wherein the claimed invention comprises an optical switch wherein the mirror formed on the substrate has

reflectivity greater than 96%, the specific geometric dimensions, specific spacing between optical input and outputs, and switching signal strength, as claimed.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following references are being cited for disclosing optical switches and cross-connects using MEMs devices: Kiang et al. (5867297); Aksyuk et al. (5994159); Aksyuk et al. (6300619); Peeters et al. (6300665); and Koh (6363183).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gary O'Neill whose telephone number is 703-306-4828. The examiner can normally be reached on Monday - Thursday, 6:30AM - 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Georgia Y Epps can be reached on 703-308-4883. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7725 for regular communications and 703-308-7725 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Gary O'Neill
Examiner
Art Unit 2873

GO
May 18, 2002